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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/608,094	06/30/2003	Ravi F. Saraf	20140-00288-US1	5220

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EXAMINER	
FREDMAN, JEFFREY NORMAN	
ART UNIT	PAPER NUMBER
1637	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/13/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/608,094	SARAF, RAVI F.	
	Examiner	Art Unit	
	Jeffrey Fredman	1637	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 February 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *160-163 and 165-200* is/are pending in the application.

4a) Of the above claim(s) *167-200* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *160-163,165 and 166* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *2/13/07*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement filed December 7, 2006 complies with the IDS rules and the quantum dot reference is considered.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. The rejection of claims 160-163 under 35 U.S.C. 102(b) as being anticipated by Adams et al (U.S. Patent 5,641,658) is withdrawn in view of the amendment.

4. Claims 160-163 and 165 are rejected under 35 U.S.C. 102(e) as being anticipated by Heller et al (U.S. Patent 6,017,696).

Heller teaches a method comprising:

a) *Providing a substrate having defined therein an array of periodically spaced regions capable of defining a writable segment in a nucleic acid molecule at one or more locations where said periodically spaced regions contact said nucleic acid molecule* (see figures 8 and 9, column 7, lines 5-31, where thousands of

sites are taught and column 46, example 12, where Heller teaches the APEX chips which have nucleic acids located in multiple different micro locations),

b) *Providing at least one double stranded nucleic acid molecule on said substrate thereby defining a plurality of said writable segments in said nucleic acid molecule at one or more locations where said periodically spaced regions are in contact with said nucleic acid molecule* (see column 46, example 12, where double stranded DNA is formed on the array in each microlocation as shown in lines 25-45),

c) *denaturing at least one of said writable segments by heating at least one of said writable segments by passing electrical current through a metal element arranged in or on the substrate* (see column 46, lines 63-67 to column 47, lines 1-3, where Heller teaches denaturation of the segments placed on electrodes which are metal elements, as Heller notes at column 32, example 5, where aluminum and gold are used. Further, when Heller teaches passing voltage through the element, this also means current is passing through the element as per V=IR),

d) *attaching at least one insertion compound to at least one nucleotide in said at least one writable segment* (see column 47, lines 4-35, and colum 46, lines 54-62, where dNTPs are added to the nucleic acid)

wherein said information is defined by the presence or absence of said insertion compound (see column 47, lines 20-35, where the information in the sequences is defined by whether amplification occurs or not).

With regard to claim 161, Heller teaches incorporation of one nucleotide (see column 46, lines 54-62, where dNTPs are added for incorporation).

With regard to claims 162-163, Heller teaches the use of fluorescent labels to label the DNA probes or target DNAs (see column 26, lines 5-11, for example).

With regard to claims 164-165, Heller teaches heating using electrical current through a metal element arranged in the substrate (see column 46, lines 65-67 and column 47, lines 1-3, where voltage is applied through the electrode on the chip to denature the sample which will heat the sample).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claim 166 is rejected under 35 U.S.C. 103(a) as being unpatentable over Heller et al (U.S. Patent 6,017,696).

Heller teaches a method comprising:

a) *Providing a substrate having defined therein an array of periodically spaced regions capable of defining a writable segment in a nucleic acid molecule at one or more locations where said periodically spaced regions contact said nucleic acid molecule* (see figures 8 and 9, column 7, lines 5-31, where thousands of sites are taught and column 46, example 12, where Heller teaches the APEX chips which have nucleic acids located in multiple different micro locations),

b) *Providing at least one double stranded nucleic acid molecule on said substrate thereby defining a plurality of said writable segments in said nucleic acid molecule at one or more locations where said periodically spaced regions are in contact with said nucleic acid molecule* (see column 46, example 12, where double stranded DNA is formed on the array in each microlocation as shown in lines 25-45),

c) *denaturing at least one of said writable segments by heating at least one of said writable segments by passing electrical current through a metal element arranged in or on the substrate* (see column 46, lines 63-67 to column 47, lines 1-3, where Heller teaches denaturation of the segments placed on electrodes which are metal elements, as Heller notes at column 32, example 5, where aluminum and gold are used. Further, when Heller teaches passing voltage through the element, this also means current is passing through the element as per V=IR),

d) *attaching at least one insertion compound to at least one nucleotide in said at least one writable segment* (see column 47, lines 4-35, and colum 46, lines 54-62, where dNTPs are added to the nucleic acid)

wherein said information is defined by the presence or absence of said insertion compound (see column 47, lines 20-35, where the information in the sequences is defined by whether amplification occurs or not).

With regard to claim 161, Heller teaches incorporation of one nucleotide (see column 46, lines 54-62, where dNTPs are added for incorporation).

With regard to claims 162-163, Heller teaches the use of fluorescent labels to label the DNA probes or target DNAs (see column 26, lines 5-11, for example).

With regard to claims 164-165, Heller teaches heating using electrical current through a metal element arranged in the substrate (see column 46, lines 65-67 and column 47, lines 1-3, where voltage is applied through the electrode on the chip to denature the sample which will heat the sample).

Heller does not specifically teach the use of 100 nanosecond pulses.

Heller does, however, teach "The amount of voltage and the time period of application will be dependent on the length and base composition of the hybrid DNA complex (see column 46, line 66 to column 47, line 1).

It would have been prima facie obvious to one of ordinary skill in the art at the time the invention was made to use the routinely optimized time for application of current since Heller teaches "The amount of voltage and the time period of application will be dependent on the length and base composition of the hybrid DNA complex (see column 46, line 66 to column 47, line 1). An ordinary practitioner would have recognized that the results optimizable variables of pulse length of the current could be adjusted to maximize the desired results. As noted in *In re Aller*, 105 USPQ 233 at 235,

> More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.

Routine optimization is not considered inventive and no evidence has been presented that the selection of specific times for current application was other than routine, that the products resulting from that optimization have any unexpected properties, or that the results should be considered unexpected in any way as compared to the closest prior art.

Response to Arguments

7. Applicant's arguments filed February 13, 2007 have been fully considered but they are not persuasive.

Applicant argues that the use of "electrical denaturation" differs from "heat denaturation". This argument is not persuasive since the imposition of electrical voltage on a spot will not only alter the electrical characteristics, but will also generate increased heat. Therefore, the denaturation of Heller will function using both heat and electrical denaturation modes. Application of voltage, by the standard equation, V=IR, on a resistant molecule such as DNA, will inevitably result in heating the molecule and the electrode. The claim, as written, uses the open "comprising" format. Consequently, the claim is open to a combination of heat and electrical denaturation. The current of Heller will provide some heat increase and some electrical denaturation. This references therefore remains properly anticipatory and the obviousness rejection is therefore also maintained.

The inherency of Heller can be demonstrated using Erickson et al (Anal. Chem. (2005) 77:4000-4007). Erickson shows in figure 5(a) that voltage gradient of 500-600 volts/cm results in a temperature of 50-70 C, and increasing, which are denaturing

temperatures. Heller teaches application of 150 volts at column 38, line 12, to an array which is less than a half a centimeter in length for simple stringency control. Consequently, the resulting temperature should fall within the range taught by Erickson, indicating that increased voltages necessary for denaturation would result in even higher temperatures.

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffrey Fredman whose telephone number is (571)272-0742. The examiner can normally be reached on 6:30-3:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gary Benzion can be reached on (571)272-0782. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Jeffrey Fredman
Primary Examiner
Art Unit 1637
3/9/07